

types on the Calabar coast. Of *Celina* all the species previously known were four from South America, one of which and another is also found in the United States. There are now :—

- Celina latipes*, Aubé. Interior of Brazil.
- *aculeata*, Aubé. Brazil.
- *angustata*, Aubé. United States and Cayenne.
- *grossula*, Leconte. Louisiana.
- *parallela*, Bab. Rio Janeiro.
- *hydroporoides*, Murr. Old Calabar.

[To be continued.]

XXX.—*On the Entozoa of Man and the Domestic Animals in Iceland.* By M. H. KRABBE\*.

THERE has long existed in Iceland a very serious endemic disease which usually attacks the liver, where it causes tumours often of very large size, but also affects other organs, although less frequently. This disease has not escaped the attention of the physicians of the country; but until recently they were very imperfectly aware of its nature, and regarded it as a chronic hepatitis, an affection which presents itself but rarely in cold climates.

During a residence in Iceland in 1847 and 1848, M. Schleisner ascertained that it was not a disease peculiar to the liver, and at the same time demonstrated that it was produced by hydatids, which M. Eschricht subsequently recognized as *Echinococci*. At this period the investigations of Siebold, Küchenmeister, and Leuckart having thrown much light upon the relations of the vesicular worms to the *Tænia*s, the frequency of *Echinococci* in Iceland strongly attracted the attention of these naturalists; and, as I was fortunate enough to have assisted at the previous investigations of Eschricht, this question likewise awakened all my interest. It was in the domestic carnivora that the corresponding *Tænia*s were to be sought; and, in order that I might thoroughly know the worms which these animals harbour, and at the same time establish a basis of comparison for researches in Iceland carried on for several years, I made a special study of the *Entozoa* in question at the Veterinary School of Copenhagen.

On examining the intestines of 500 dogs of Copenhagen and its environs, I found *Tania marginata* in 14 per cent. of them,

\* Translated by W. S. Dallas, F.L.S. &c., from the 'Comptes Rendus,' January 21, 1867, pp. 134-138.

*T. cœnurus* in 1, *T. serrata* in 0·2, *T. echinococcus* in 0·4, *T. cucumerina* in 48, *Bothriocephalus*, sp., in 0·2, *Ascaris marginata* in 24, and *Dochmius trigonocephalus* in 2.

The distinctive characters of the first three species, established by Küchenmeister and Leuckart, have been disputed by other distinguished helminthologists; but, by examining these *Tænia*s carefully (as was done by M. Baillet at Toulouse), without knowing beforehand whence the worms originated, I convinced myself of their differences. In France M. Baillet has most commonly found *T. serrata* in dogs, and also frequently *T. marginata*; but he never found *T. cœnurus* except in animals which had been experimented upon. In Denmark *T. serrata* occurs but rarely, which is explained by the fact that few rabbits are bred there. Moreover, as regards the worms most commonly observed, I was able to ascertain the influence exerted by the age and size of the dogs, by the place which they inhabited, and their state of health. Thus the frequency of *Tænia marginata* increases considerably with age, and in a still higher degree with the size of the dogs; it is more common in the dogs of the suburbs than in those of Copenhagen, and is less frequently met with in sickly than in healthy dogs—facts which are explained by the mode in which those animals acquire the *T. marginata*.

The frequency of *T. marginata*, *cœnurus*, and *echinococcus* in Iceland depends especially upon the great number of sheep which the inhabitants possess, as their vesicular worms are the cause of the development of these *Tænia*s in the dogs. *Tænia canis lagopodis* is a very remarkable species; besides the dog, it is found in the cat and the *Isatis*; and, although mentioned by Abildgaard, it has not yet been described. This worm has the head unarmed, and is not furnished with genital orifices at the edges of the joints, by which, combined with a peculiar conformation of the internal organs, it approximates to *T. angustata*, *T. litterata* (a species still but imperfectly known), and *Mesocestoïdes ambiguus* of Vaillant. As to the *Bothriocephali*, those which I met with in the dogs of Iceland not only differed from *B. latus* and *cordatus*, but also varied so much among themselves that it is not without doubt that I venture to refer them to the same species. Some of these worms, which, although of considerable size, were completely destitute of generative organs, presented a mode of development of the joints quite unknown among the *Tænia*s, but which has been indicated in some *Bothriocephali* by Eschricht and Siebold. I refer to the increase of the number of joints by means of the secondary transverse division of the formed joints, a division which may even be repeated. Something analogous to this occurs also in various species of *Bothriocephali* inhabiting the intestines of the Seals,

as I had the opportunity of verifying at the museum of the University, where I examined a great number, chiefly collected in Greenland. Among these was *B. cordatus*, the commonest cestoid worm in the dogs of Greenland, but which also inhabits, besides man, *Phoca barbata* and *Trichechus Rosmarus*. It is not, however, in this *Bothriocephalus* that the phenomenon in question is met with, but in the species which I have called *B. variabilis* (from *Phoca cristata* and *barbata*) and *B. fasciatus* (from *P. hispida*).

It is particularly remarkable that whilst *Tænia cucumerina* is very common in the dogs of Iceland, I did not once meet with *T. elliptica* in the cats—a fact which renders the distinctness of these two species probable.

It is incontestable that in Iceland the *Echinococci* are the cause of one of the most dangerous maladies of man that exist in that country. Nevertheless its frequency has been somewhat exaggerated. M. Schleisner's opinion, that one-seventh of the inhabitants are attacked by it, is founded partly only upon a mere estimate. From observations collected during six years by M. Finsen, a physician in the north of Iceland, we must infer that the number of persons affected by *Echinococci* in a degree sufficient to allow the malady to be recognized is between one-fortieth and one-fiftieth of the population, which, indeed, is a high number.

Moreover it is always the *Echinococcus*, and not any other vesicular worm, that attacks the Icelanders. With regard to *Cysticercus tenuicollis*, mentioned with some reserve by Eschricht, the case to which he called attention no doubt rests upon an error: there is nothing to render probable the appearance of this worm in the human subject in Iceland.

According to Leuckart, the *Echinococci* of man and the domestic animals belong to a single species; and the researches that I was able to make in Iceland tend to confirm his assertion. It is by means of experiment, as indicated by Leuckart, that we must seek to test this opinion; and of six experiments made by me, in concert with M. Finsen, there are two which at least render it probable, and a third which can leave no doubt, as it had exactly the same result as a similar experiment made the same year at Berlin by M. Naunyn. Both of us have thus obtained the transformation of *Echinococci* procured from the human subject into *Tænia echinococcus* in the dog. In Iceland this little *Tænia* occurs in the dogs with extraordinary frequency; and both the large and small cattle harbour great numbers of vesicular worms, which furnish those animals with their cystic *Tænia*s, namely *Echinococcus*, *Cysticercus tenuicollis*, and *Cænu-rus cerebrialis*. On comparing 100 Icelandic dogs which I ex-

amined with 317 Danish dogs, all more than one year old, I found:—

	In the Icelandic dogs.	In the Danish dogs.
<i>Tenia marginata</i>	75 per cent.	20 per cent.
— <i>cœnurus</i>	18 „	1 „
— <i>echinococcus</i>	28 „	0.6 „

The number of dogs in Iceland is very great, and certainly unnecessarily so, although these animals are indispensable to the inhabitants, especially for bringing the sheep together. From the inquiries that I made on this subject, there is every reason to believe that this number may be taken as 1 for every 3–5 inhabitants; whilst in France, where they are subject to a tax, it is 1 to 22; and in Great Britain, where the tax on dogs is higher, it is only 1 to 50 inhabitants.

The proportion of cattle in Iceland is likewise very considerable, as for every 100 inhabitants there were:—

	Sheep.	Horned Cattle.	Pigs.	Total.
In Iceland (1861)	488	36	0	524
In Denmark (1861)	109	70	19	198
In Prussia (1858)	87	31	15	133

The Ruminants continually furnish the dogs with *T. echinococcus*, the ova of which are the origin of Echinococcus-hydatids both in man and cattle; and the frequent contact of the inhabitants with their dogs in damp and dirty dwellings must favour the propagation of the parasites in a high degree.

It is consequently by diminishing as much as possible the number of dogs, and by preventing them from eating the vesicular worms of the cattle, that we may succeed in combating the development of hydatids in man, as also of staggers in sheep. In the report which I addressed to the ministry in 1863, I proposed:—1. That the right to have dogs in Iceland should be regulated, in order that their number might be reduced to what was strictly necessary; 2. That a small memoir should be distributed among the Icelanders, in order to explain to them the part played by the dogs in the hydatid disease of man and the staggers of the sheep, and to indicate to them the precautions to be taken to hinder the development of those maladies. These propositions were adopted by the ministry. A popular treatise which I wrote upon this subject was translated into Icelandic and dispersed over the whole country; and, with regard to the first point, the authorities in Iceland pronounced in favour of the establishment of a tax on dogs.